January 16, 2002

National Transportation Program /Onsite Working Group

Cost-Effective Implementation of 10 CFR 830 Transportation Requirements (Rev. 0)

Issue

Develop a cost-effective approach to implementation of 10 CFR 830 Subpart B, Onsite Transportation Requirements at DOE sites.

Issue Description

During the comment period for changes to 10 CFR 830, a number of organizations and individuals questioned the propriety of applying fixed nuclear facility requirements to an onsite transportation program that had its own requirements, as implemented through **DOE Order 460.1A, Packaging and Transportation Safety and DOE G 460.1-1, Implementation Guide *for Use with* DOE O 460.1A (& similar 461.1 Order and Manual for Defense Programs)**. The Order is based on the conservative requirements of the Nuclear Regulatory Commission (NRC) and the Department of Transportation (DOT), which are applicable to the commercial movement of radioactive materials on public roads. The Order provides for the characterization and classification of radioactive materials, and their preparation and packaging. It also requires an onsite transportation safety program that provides an equivalent level of safety to workers, the public and the environment as would be achieved through compliance with NRC and DOT standards. This onsite transportation safety program and equivalent safety must be adequately demonstrated and documented in a formal Transportation Safety Document (TSD) approved by the Department of Energy. As a result, safe-harbor provisions were added to the 10 CFR 830 Final Rule (published on January 10, 2001) which endorse the methods and processes described in DOE Order 460.1A and DOE Order 461.1 and associated guidance, as acceptable ways to satisfy the rule requirements for transportation activities covered by the provisions of this rule.

Some people interpret the Rule to require development and implementation of a Technical Safety Requirements (TSR) program and an Unreviewed Safety Question (USQ) program for onsite transportation, even though neither program is a part of the NRC/DOT regulatory standards and practices that onsite programs are modeled after. The NRC/DOT approach parallels international transportation safety standards, which restrict and control payloads, and prescribe package and transport system performance standards against defined normal and accident conditions based on the degree of hazard posed by more than 400 radionuclides. This well-established approach has been internationally accepted as adequate for even extremely high-curie radioactive shipments over public roads, railways, water and air.

This issue paper contends that application of expensive nuclear facility based TSR and USQ programs to onsite transportation is an inappropriate use of scarce DOE resources, and that the intent of TSR and USQ programs for nuclear facilities is already met by compliance with DOE Order 460.1A and G 460.1-1. As evidence of the viability of this statement, Attachment 1 provides a cross-walk between 10 CFR 830 Subpart B requirements and the existing DOE Order 460.1A based approach to onsite transportation safety. Attachments 2and 3 provide supplemental information relating TSR and USQ activities with similar transportation activities.

The present onsite transportation safety system provides a safe, effective operational atmosphere as evidenced by the absence of releases attributable to circumstances that would fall within traditional TSR/USQ space. The DOE Occurrence Reporting and Processing System (ORPS) has monitored onsite transport since 1993. During this time there have been over 36,180 occurrences, of which approximately 1,300 were onsite/offsite transportation or packaging related (Attachment 4). Of these packaging and transportation occurrences, 11 involved slight leaks from Type A or lesser containers. The ORPS consequence measures rated the leaks as "slight" or "anomalies". From packages that would carry Curie quantities near or above DOE STD 1029-92 thresholds (Type B packages), there were no leaks or spills reported. It is thus the contention of the Transportation Community**,** that the 460.1A based process is well established, effective and safe, and imposition of new Rules will not provide additional safety to workers and the environment during onsite transportation of radioactive materials.

Background

The concept of Technical Safety Requirements (TSRs) originated with the reactor Technical Specifications used by the NRC for facilities that are typically quite complex in design and operation. The intent of TSRs (presented in DOE Order 5480.22, "Technical Safety Requirements") is to provide reasonable assurance that the nuclear facility "will not threaten the health and safety of the public or pose an undue risk to workers from uncontrolled releases of radioactive or other hazardous materials and inadvertent criticality." That intent is being met by sites which, under DOE Order 460.1A and Order 461.1, have DOE approved onsite transportation programs which provide safety equivalent to that provided by NRC/DOT regulations for offsite transportation. It is noteworthy that the NRC, the agency that originated the TSR concept, does not include TSRs in the radioactive material transportation regulations.

An additional characteristic of facility TSRs is that they are not applied to all situations that can affect safety. They are applied only to prevent or mitigate situations which could significantly jeopardize the health and safety of workers, and/or the public. For many of the DOT-authorized radioactive material packages, e.g., the Type A and lower categories, there is already a presumption that the packaging will not withstand accidents. The package contents are limited so that in an accident (i.e., contents released) the dose to an individual would be unlikely to exceed 5 rem. In the facility arena, accidents whose worst-case dose is 5 rem may not be considered candidates for TSR protection. It is inappropriate to apply more conservative standards to onsite transportation than those

applied to fixed nuclear facilities. Attachment 5 provides a comparison of DOT A2 Curie values and 1027-92 threshold values.

The USQ process at fixed nuclear facilities is used to examine operational, procedural or design changes within the facility to ensure adequate safety is maintained in accordance with the authorization safety basis and to identify the proper approval levels for these changes. This process is necessary to accommodate the frequent changes required to maintain and operate a facility, and to facilitate these changes in a safe, cost effective and timely manner. These frequent changes are not normally required for packaging and transportation systems, which are designed for specific missions and campaigns over limited time frames.

It should also be mentioned that the USQ process is inherent in any well-structured design change program. The "Question and Answer" process associated with facilities is well founded because of the potential complexity and "balance-of-plant" issues involved. Having a formal USQ process for dealing with package design and payload changes is not necessary because of the simplicity of the issues.

Cost-Benefit Considerations

All government agencies, especially at this time, are duty bound to consider the costs as well as the benefits associated with proposed activities. Although use of TSRs/USQs would provide another layer of control and specificity to onsite transportation, there is essentially no benefit that is not already provided by a program based on DOE Order 460.1A. That Order requires onsite transfers be made in compliance with, or safety equivalent to, the very conservative NRC/DOT requirements. If the NRC/DOT approach to transportation safety is sufficient to protect the health and safety of the public during high-speed transportation over an aging infrastructure, through varying weather conditions, and encounters with drunk drivers, etc., it is certainly sufficient for DOE sites with controlled access, a highly trained workforce, nearby emergency responders, and rapid communications.

All the DOE sites understand the costs of a rigorous TSR/USQ program. The detailed requirements for such programs are very prescriptive, involve expensive development, documentation, and personnel training and qualification as USQ reviewers, and are based on establishing a direct link between the safety analysis and the need for the TSR. Analysis leads to the conclusion that there should be no formal TSR program for onsite transportation.)

A survey (Attachment 6) of the DOE sites has been conducted to ascertain the approximate costs of implementing a TSR/USQ program for onsite transportation. For large sites that have extensive packaging inventories, the cost is expected to be quite high. Because there is no apparent benefit that would match such investments, TSRs/USQs should not be applied to onsite transportation unless there is a clear enhancement of safety or cost savings.

Recommendation

Achieving the desired interpretation that the DOE Order 460.1A safe harbor is considered sufficient to meet all requirements of the Rule including TSRs/USQs is straightforward, and no actual change to the Rule is necessary. In the January 10, 2001 Federal Register notice, there is the following statement on Page 1812:

> "We are amending the Rule to add two additional "safe harbor" methods [including DOE Order 460.1A] as acceptable ways to satisfy the Rule requirements for transportation activities covered by the provisions of this Rule."

That wording is sufficiently broad to accommodate an interpretation that the safe harbor is robust and that TSRs/USQs are not necessary when DOE Order 460.1A is being met.

Path Forward

The Director, Office of Nuclear & Facility Safety Policy (EH-53), Office of Environment, Safety & Health, the author of 10 CFR Part 830, should issue a formal interpretation that the safe harbor requirements in the Rule are robust and TSRs/USQs are not necessary when DOE Order 460.1A is being met. In addition, Office of Safety, Health and Security (EM-5), Office of Environmental Management, author of DOE Transportation Safety Order 460.1A should enhance and update current guidance for cost effective implementation of "Safe Harbor " provisions of 10 CFR Part 830

Attachments

1 10 CFR 830/G 460.1-1 Cross-walk (2 Pages)
2 TSR/Onsite Transportation Cross-walk (3 Pages)
3 USQ/Onsite Transportation Cross-walk (5 Pages)
4 Onsite Packaging Safety Summary (3 Pages)
5 Facility/Transportation Thresholds/Values (3 Pages)
6 Onsite Working Group Survey Summary (2 Pages)

Attachment 1

10 CFR 830/G 460.1-1 Cross-walk

10 CFR 830 SUBPART B REQUIREMENTS	SUMMARY OF REQUIREMENTS THAT APPLY TO TRANSPORTATION (NOT REGULATED BY DOT).	EXCERPTS FROM DOE G460.1-1 GUIDANCE RELATING TO 10 CFR 830 REQUIREMENTS
.200 Scope	Transportation activities not regulated by DOT are included in the definition of a DOE "nuclear facility" (§ 830.3 – Definitions).	DOE G460.1-1, sec 5.1.1. "The purpose of this section is to provide guidance to DOE Field Elements and DOE contractors for implementation of the requirements of DOE O 460.1A, Paragraph 4.b, "Onsite Safety Requirements".
.201 Performance of Work	Work must be performed in accordance with the safety basis for a hazard Cat 1, 2, or 3 DOE (per STD-1027-92) nuclear facility, and with hazard controls that ensure adequate protection of workers, the public, and the environment.	DOE G460.1-1, sec 5.1.2. "In the performance of onsite packaging and transportation activities, assurance must be given that proper safety, health, and environmental protection are maintained. For onsite transfers of hazardous materials at DOE sites, this assurance can be provided by specification of operational safety procedures in the site-specific Transportation Safety Document (TSD). Adherence to federal regulations normally applicable to offsite transportation is an acceptable approach to meeting the onsite safety requirements. However, an alternative, integrated approach which considers the packaging in combination with specified communication and control measures is also acceptable."
.202 Safety Basis	Establish and maintain the safety basis for Cat 1, 2, or 3 nuclear facilities in a documented safety analysis (DSA).	DOE G460.1-1, sec 5.3.1. DOE O 460.1A requires that 1) deviations from DOT for onsite transfers be documented in an approved site-specific TSD that describes the methodology and compliance process to meet equivalent safety measures relative to deviations from the Hazardous Material Regulations (HMR), and 2) all onsite transfers shall comply with either the HMRs or an approved TSD (one year from incorporation into site contract).
.203 Unreviewed Safety Question process	The responsible contractor (for Cat 1,2 or 3 DOE facility) must establish, implement, and take actions consistent with a USQ process meeting the requirements of this section.	DOE G460.1-1, sec 5.3.2. The TSD documents the onsite packaging and transportation program and demonstrates its compliance with DOE transportation safety requirements. The TSD also states who is responsible for control of document distribution and for preparation and distribution of document updates. This is interpreted to include design and procedure changes.

Attachment 1

10 CFR 830/G 460.1-1 Cross-walk

10 CFR 830 SUBPART B REQUIREMENTS	SUMMARY OF REQUIREMENTS THAT APPLY TO TRANSPORTATION (NOT REGULATED BY DOT).	EXCERPTS FROM DOE G460.1-1 GUIDANCE RELATING TO 10 CFR 830 REQUIREMENTS
.204 Documented Safety Analysis	Obtain DOE approval of the methodology used to prepare DSA. The DSA must be appropriate for the hazards.	DOE G460.1-1, sec 5.3.1 & 5.4.1. TSD describes the methodology and compliance process to meet equivalent safety measures and is approved by the DOE Field Element. The performance requirements imposed on each hazard level in the hazardous materials hierarchy should be documented in the TSD (use of a graded approach).
.205 Technical safety requirements	Technical safety requirements must be developed from the DSA and be DOE approved prior to use.	DOE G460.1-1, sec 5.4.2. Reliance on packaging performance is a preferred way to ensure overall safety; however, an integrated approach which considers the packaging in combination with specified communication and control measures is also acceptable. Packaging should be categorized as 1) DOT, 2) DOT equivalent or 3) non-equivalent. DOT and DOT equivalent packaging can be shown conclusively to provide performance equivalent to DOT. Before non-equivalent packaging may be used for onsite transport, a performance envelope should be established for the packaging and specific control and communication requirements should be developed which ensure that the transport system will operate safety within the performance envelope.
.206 Preliminary documented safety analysis	A preliminary documented safety analysis must be prepared for facilities that begin construction after 12/11/2000.	DOE G460.1-1, sec 5.3.2.f. TSD references site-specific standards, procedures, and instructions applicable to onsite packaging. This includes design, fabrication, and quality elements and applicable codes and standards.
.207 DOE approval of safety basis	A safety basis must be submitted for DOE approval by April 10, 2003. If the existing safety basis already meets this subpart the contractor must document this to DOE by April 9, 2001.	DOE G460.1-1, sec. 5.3.1. DOE O 460.1A states that no later than one year from the date of incorporation of the Contractor's Requirements Document into the contractor's contract, all onsite transfer shall comply with either the HMRs or an approved TSD.
Appendix A General Statement of Safety Basis Policy	Table 2 lists safe harbor options for preparation of DSA	DOE G460.1A compliant TSDs and Package Specific Safety Documents (PSSD) meet the DSA requirements.

Attachment 2

TSR/Onsite Transportation Cross-walk

Technical Safety Requirements (TSR) have their origins in requirements for Fixed Nuclear Facilities while onsite radioactive (RAM) transportation requirements have their origins in Department of Transportation (DOT) based methodology. The facility safety and DOT methodologies were developed independently and were not originally intended for use together. The terminology, radiological basis, and methodologies vary significantly between the two approaches to safety. It is noteworthy, however, that despite the differences, the results of each are essentially the same.

The National Transportation Program (NTP), Onsite Working Group (OWG), developed the supplemental information provided below as a desktop aid in cross-walking the TSR requirements of 10 CFR 830 with comparable transportation limits and requirements.

I. *Purpose of TSRs.* TSRs consist of safety limits, operating limits, surveillance requirements, administrative controls, use and application instructions, and the basis thereof. TSRs are based on information in the facility Safety Analysis Report (SAR) and set forth specific limits and requirements. In areas that the SAR does not directly supply all of the input for the TSR, such as surveillance intervals and acceptance of criteria, national and international codes, standards, and guides are to be used whenever possible. Sections II and III provide specific information related to Technical Safety Requirements issues and equivalent Transportation Requirements issues.

Attachment 2

TSR/Onsite Transportation Cross-walk

II. *TSR*. Technical Safety Requirements and their equivalent Transportation Requirements. *Note: the safety requirements in 49 CFR establish packaging and transportation safety parameters (highest level TSRs). Site procedures that invoke the P&T safety parameters may also be viewed as TSRs. The table below lists limits and requirements that may be specified in site level TSRs.*

Technical Safety Requirements	Comparable Transportation limits and Requirements.
Use and Application. Basic instructions for using and applying the safety restrictions contained in the TSRs	Basic instructions for using and applying the safety restrictions are contained in the *TSD/PSSD or in site level procedures.
Safety Limits (SL). The variables and values that define safe limits of operation	Content Limits and Transportation Controls. Packaging configuration, content limits, and transportation controls (if applicable).
Operating Limits – Limiting Control Settings (LCS). Control settings to prevent exceeding SLs (i.e. alarms)	Transportation Controls. Transportation system control values (if applicable). For example, monitor temperature or pressure during transport.
Operating Limits – Limiting Conditions for Operation (LCO). Defines minimal level of safe operation.	Transportation Controls. Limiting conditions for transportation (if applicable). May include ambient temperatures, weather conditions, time controls (off-peak traffic hours), and speed limits.
Surveillance Requirements. Contains requirements (e.g. relating to test, calibration, inspection) necessary to maintain operation of the facility within the SLs, LCSs, and LCOs.	Quality Assurance & Maintenance. Activities required to keep packaging configuration, content limits and transportation procedures within TSD/PSSD values.
Administrative Controls. Provisions relating to organization and management, procedures, record keeping, reviews, and audits necessary to ensure safe operation	Provisions relating to transportation and packaging organization and management, procedures, record keeping, reviews, and audits necessary to ensure safe transportation and packaging operation.
Appendices. Basis – summary of operating limits and associated surveillance requirements. Design Features – passive design features which, if altered, would have significant effect on safe operation	Certificate of Compliance or site approval document that summarize content limits, packaging configuration and configuration control, transportation controls, and communications, and conditions for transportation approval.

* Transportation Safety Document/Package Specific Safety Documentation

Attachment 2

TSR/Onsite Transportation Cross-walk

III. *Violation of TSR.* Violations of the TSR occur as the result of four circumstances.

TSR VIOLATIONS	COMPARABLE TRANSPORTATION CIRCUMSTANCES
1. Exceeding a Safety Limit (SL)	Exceeding content limits
2.a. Failure to act within specified time following exceeding a Limiting Control Setting (LCS)	Not directly applicable, but lading above established limits could be considered as exceeding a LCS.
2.b. Failure to act within specified time following failure to meet Limiting Conditions of Operation (LCO)	Not directly applicable, but an off-normal event or accident could be considered an LCO. Example: after accident, notify emergency response and set up exclusion boundary around package(s).
2.b. Failure to act within specified time following failure to successfully meet a Surveillance Requirement (SR)	This is applicable since surveillance is carried out at multiple stages during package loading and transport. Example:
3. Failure to perform a surveillance within the required time limit	This is applicable since surveillance is carried out at multiple stages during package loading and transport. Example: dose rate measurements are not completed prior to shipment.
4. Failure to comply with an Administrative Control (AC) requirement	This is applicable since administrative controls may be used during transportation. Example: failure to carry out escorting requirements during onsite transfer.

Attachment 3

USQ/Onsite Transportation Cross-walk

The Unreviewed Safety Question process has its origins in requirements for Fixed Nuclear Facilities while onsite radioactive (RAM) transportation requirements have their origins in Department of Transportation (DOT) based methodology. The facility safety and DOT methodologies were developed independently and were not originally intended for use together. The terminology, radiological basis, and methodologies vary significantly between the two approaches to safety. It is noteworthy, however, that despite the differences, the results of each are essentially the same.

The supplemental information provided below was developed by the National Transportation Program (NTP), Onsite Working Group (OWG) as a desktop aid in cross-walking the requirements of 10 CFR 830 with applicable transportation activities.

I. *Purpose of USQ*. A USQ is a situation that has not been previously reviewed or approved by DOE. The USQ Process determines if a Proposed Activity (PA) is inside or outside of the existing Authorization Basis (AB). The USQ Process involves 1) a USQ Screening (USQS) to identify those PAs that require USQ Safety Evaluation (USQE) and 2) a USQ Safety Evaluation. Overall the USQ Process preserves the AB while allowing for operational flexibility. Sections II – V provide specific information related to USQ issues and equivalent Transportation issues and section VI lists definitions.

II. *USQ Criteria*. A USQ is a situation which has not been previously reviewed or approved by DOE, and meets one or more of the following conditions:

Facility Based USQ Criteria	Example: Transportation Based USQ Criteria
Frequency of accident previously evaluated (PE) may increase	Frequency of PE transport accident may increase
Consequence of accident PE may increase	Consequence of PE transport accident may increase
Frequency of malfunction of important to safety equipment PE may increase	Frequency of PE transport system malfunction may increase
Consequence of malfunction of important to safety equipment PE may increase	Consequence of PE transport system malfunction may increase
Possibility of accident not PE may be created	Possibility of a new accident may be created
Possibility of malfunction of important to safety equipment not PE may be created	Possibility of malfunction of transport system equipment not PE may be created
Margin of safety defined in basis for any TSR or SAR analysis could be reduced	Margin of safety defined in TSD/PSSD could be reduced

Transport system = packaging + controls + communications

Attachment 3

USQ/Onsite Transportation Cross-walk

III. *Proposed Activity or Found Condition where USQ Process is Applicable.* The USQ Process shall be initiated for, but not limited to, the following:

Facility Based PA	Example: Transportation Based PA
Permanent or temporary hardware change	Change to transportation system hardware
Permanent or temporary procedure change	Change to transportation system or facility procedures
New operations, tests or experiments	New contents, hardware, or transportation conditions.
Potential Inadequacy in Safety Analysis	Potential inadequacy in TSD/PSSD
Discovery of discrepancy between configuration and analysis	Discovery of discrepancy within TSD or PSSD (e.g. between hardware and analysis).
An AB change involving TSR bases	A change to the TSD/PSSD.

IV. *USQ Screening (USQS)*. The process for determining if a PA requires a USQE (i.e. will the PA possibly take you outside the AB). USQS involves completion of a checklist with the following five questions. If the answer to any of the questions is yes, then a USQE is required.

Facility Based Screening Questions	Example: Transportation Based Screening Questions
Describe PA or discovery (PA/d)	Describe the transportation PA
Is PA/d a change to a TSR – Y/N	
Does PA/d involve a change to AB – Y/N	Does PA involve a change to the TSD or PSSD
Does PA/d involve change to procedure described in AB – Y/N	Does PA involve a change to a transportation procedure
Does PA/d involve a test or experiment not described in AB – Y/N	Does PA involve new contents, hardware, or transportation conditions
Does PA/d involve analytical errors, omissions or deficiencies in the AB – Y/N	Does PA involve any errors, omissions or deficiencies in the TSD/PSSD or Transportation Procedures

Attachment 3

USQ/Onsite Transportation Cross-walk

V. *USQ Evaluation (USQE).* A USQE is a record that documents the review of a "change" (the PA). The USQE involves addressing seven questions. If the answer to any of the questions is yes, then the change is considered to be an USQ.

Facility Based USQE Questions	Transportation Based Evaluation Questions
Could PA increase frequency of accident previously evaluated in AB (PEAB)?	Could PA increase the frequency of an accident previously evaluated in the TSD/PSSD as non-credible?
Could PA increase consequence for an accident PEAB?	Could PA increase the consequences of an accident previously evaluated in the TSD/PSSD beyond the limits established for the package?
Could PA increase frequency of malfunction of safety equipment PEAB?	
Could PA increase the consequence of malfunction of safety equipment PEAB?	
Could PA create accident of different type than PEAB?	Could PA create the possibility of a new accident that is not evaluated in the TSD/PSSD?
Could PA create malfunction of safety equipment (different failure mode) than PEAB?	
Could PA decrease margin of safety for any TSR or analysis in AB?	Could PA decrease the margin of safety currently defined in the TSD/PSSD as follows. Could PA; a. Adversely affect structural performance of the package or any supporting hardware? b. Cause violation of any thermal performance limits established for the package? c. Cause violation of any containment limits established for the package? d. Cause violation of any criticality limits established for the package? e. Cause violation of any shielding limits established for the package? f. Cause violation of any maintenance steps established for the package? g. Cause violation of any operational steps established for the package? h. Cause violation of any quality requirements established for the package? i. Create the possibility of a new quality requirement for the package?

Attachment 3

USQ/Onsite Transportation Cross-walk

VI. *Definitions.*

Hazard Controls**.** Measures to eliminate, limit, or mitigate hazards to workers, the public, or the environment, including (1) physical, design, structural, and engineering features; (2) safety structures, systems, and components; (3) safety management programs; (4) TSRs; and (5) other controls necessary to provide adequate protection from hazards.

Proposed Activity (PA). The term used to refer to the proposed change, test, or experiment, or analytical error, omission or inadequacy in the Nuclear Facility SB being evaluated. A change may involve a physical modification to the facility or system or a revision to a procedure. A change may be a temporary change or a permanent change. Procedure changes, even if intended to be only temporary in duration, must have a USQ Screening, except for Inconsequential Changes, and if appropriate, a USQ Evaluation performed.

Safety Analysis Report (SAR). That report which documents the adequacy of a safety analysis for a Nuclear Facility to ensure that the facility can be constructed, operated, maintained, shut down, and decommissioned safely and in compliance with applicable laws and regulations.

Safety Basis. The documented safety analysis and hazard controls that provide reasonable assurance that a DOE nuclear facility can be operated safely in a manner that adequately protects workers, the public, and the environment.

Unreviewed Safety Question (USQ). A situation where
(1) The probability of occurrence or the consequences of an accident or malfunction of important to safety equipment which was previously evaluated in the facility safety analyses could be increased, or
(2) The possibility for an accident or malfunction of important to safety equipment of a different type than any evaluated previously in the facility safety analyses may be created, or
(3) Any Margin of Safety as defined in the basis for any TSR could be reduced; (4) The DSA may not be bounding or may be otherwise inadequate.

USQ Process. The mechanism for keeping a safety basis current by reviewing potential USQs, reporting USQs to DOE, and obtaining approval from DOE prior to taking any action that involves a USQ.

Attachment 3

USQ/Onsite Transportation Cross-walk

USQ Safety Evaluation (USQE). A record that documents the review of a "change". This document records the scope of the evaluation and the logic for determining whether or not a USQ exists (Reference 1). Note that a USQE for which a USQ is indicated represents an intermediate decision in the total process. An "official USQ" exists only after all necessary WSRC reviews and approval have been obtained. A USQE is the process of determining if a PA would involve a USQ. A USQE may be done without a USQ Screening.

USQ Screening. The process of determining if a PA requires a USQE or a change to a SB.

Attachment 4

Onsite Packaging Safety Summary

Leonard Dickerson, ORNL

The DOE Occurrence Reporting and Processing System (ORPS) is an interactive computer system designed to support DOE-owned or –operated facilities in reporting and processing information concerning occurrences related to facility operations. Occurrences posted by DOE sites to the ORPS are reviewed weekly by the National Transportation Program's Safety Metric Indicator Program (SMIP) for packaging or transportation relevance. Pertinent reports are archived for analysis and trending in the SMIP P&T Occurrence database, which contains over 1,300 packaging- or transportation-related occurrences reported from FY 1993 through FY 2001 to the ORPS (which contains 36,184 occurrences for this period). Review of SMIP's database reveals that there are 190 onsite occurrence reports related to contamination events and 85 packaging events of which 20 are related to damaged packagings. The vast majority of these incidents involve radioactive material.

All of the events had consequence measures rated as *slight*[1] or *anomalies*[2]. These SMIP codes signify that none of the occurrences were considered particularly threatening and at the worse "resulted in minimal safety consequences, with little potential for ultimately leading to suspected endangerment of people or suspected contamination of property, or suspected pollution of the environment." Onsite safety of personnel or facilities was not jeopardized by these occurrences.

These incidents were reviewed to determine whether leaks or releases of contamination had occurred as a result of compromised packagings. Twenty-two reported occurrences involved leaks, of which 18 were characterized as contamination events and the other 4 events were characterized as occurrences involving damaged containers. Only 11 of these combined 22 container leaks involved radioactive material. The 11 occurrences involving leaking containers are detailed in the following table.

Attachment 4

Onsite Packaging Safety Summary

Packaging type	Type of leak	Reported Quantity of Leak
□Type A		
actinium sealed source	radon gas release	trace
55-gal storage drum*	200,000 dpm alpha (TRU MW)	teaspoon
Strong-tight		
Intermodal container	<1,000 dpm alpha LLW	spot
21st Century—dropped*	mixed waste	1 gallon
4x4x8 wooden box	mixed waste	2 ounces
□Lesser Containers		
5-gal plastic drum*	tritium-contaminated mop water	1 pint
4-mil thick waste bag	200,000 dpm MW	teaspoon
20-ml vial	2 mr/h Cs-137 sample solution	1 ml
plastic bag	16,000 dpm tritium	few drops
bagged pipe*	500,000 dpm gamma LLW	teaspoon
B-barrel wrapped in "Burrito" bag	50,000 dpm MW	table spoon

From the table several assumptions can be drawn about the robustness of the packagings and hazard of the leaks. It should be noted that only the dropped 21st Century packaging, which was dropped a distance of 3 feet from a forklift, involved a potentially significant quantity of material. (There were no personnel contaminations, equipment contaminations, or environmental impacts associated with this incident. In addition, there were no criticality safety issues associated with this occurrence, and onsite procedures mandated by DOE Orders were sufficient to expeditiously address this spill.) Had the waste type been considered more hazardous, it would have been packaged in more robust packaging form instead of only a strong-tight container.

Of the 11 onsite where radioactive material leaked from containers, two of these leaks occurred while the material was being moved by forklift and another two of these events occurred while the material was in transport on a vehicle. (These events are marked with an "*" in the table.) Two of the 11 incidents involved Type A packagings or onsite equivalents. One of the incidents with Type A packagings involved TRU-contaminated waste being transferred for over-packing before it was to be placed into a TRUPACT (Type B packaging) and the other involved a sealed source leaking during a move from one type of onsite transfer cask to a more robust one. There were no leaks or spills reported from Type B packagings.

Attachment 4

Onsite Packaging Safety Summary

Having only eleven reported onsite leaks of radioactive material in 9 years is evidence that DOE onsite policies are effective. Considering the many shipments of radioactive material that DOE makes yearly and the appreciable amount of radioactive materials handled and stored onsite, these few incidents testify that a successful management system for radioactive materials is effectively performing its function. This review of onsite occurrences demonstrates DOE's safety record with radioactive materials and emphasizes that: (1) there are few onsite releases of radioactive material; (2) releases of material have been non-threatening; (3) the releases of radioactive material that have occurred involved non-accident resistant packages and most did not occur during movement of the packages; and (4) the movement of radioactive material with potentially significant consequences in Type B packages did not result in any releases or threats to personnel or the environment. This good safety record illustrates the effectiveness of the current DOE requirements and guidance governing onsite packaging and transportation.

Note 1 and 2: Definitions of these terms can be found in the *DOE Packaging and Transportation Measurement Methodology for the Safety Metrics Indicator Program (SMIP)*, September 1999.

Attachment 5.
Facility Curie Thresholds (DOE STD 1027-92) and
Transportation A2 Values (49 CFR) (Rev. 0)

Isotope	Cat 2	Cat 3	A2	Cat 2/A2	Cat 3/A2
AC225	2.9E+03	3.2E+01	2.7E-01	10,741	119
AC227	4.3E+00	4.2E-02	5.4E-04	7,948	78
AG110M	5.3E+05	2.6E+02	1.1E+01	49,074	24
AM241	5.5E+01	5.2E-01	5.4E-03	10,166	96
AM242M	5.6E+01	5.2E-01	5.4E-03	10,370	96
AM243	5.5E+01	5.2E-01	5.4E-03	10,166	96
AU198	9.3E+06	2.0E+03	1.4E+01	688,889	148
BA133	4.0E+06	1.1E+03	8.1E+01	49,322	14
BA140	7.8E+06	6.0E+02	1.1E+01	722,222	56
BI207	2.2E+06	5.0E+02	1.9E+01	116,402	26
BI210	1.5E+05	3.2E+02	1.4E+01	11,111	24
C14	1.4E+06	4.2E+02	5.4E+01	25,878	8
CA45	4.7E+06	1.1E+03	2.4E+01	193,416	45
CA47	4.8E+06	7.0E+02	1.4E+01	355,556	52
CD109	2.9E+05	1.8E+02	2.7E+01	10,741	7
CD113	1.8E+04	1.1E+01	2.4E+00	7,407	5
CE141	3.3E+06	1.0E+03	1.4E+01	244,444	74
CE144	8.2E+04	1.0E+02	5.4E+00	15,157	18
CF252	2.2E+02	3.2E+00	2.7E-02	8,148	119
CL36	1.4E+03	3.4E+02	1.4E+01	104	25
CM242	1.7E+03	3.2E+01	2.7E-01	6,296	119
CM245	5.3E+01	5.2E-01	5.4E-03	9,797	96
CO60	1.9E+05	2.8E+02	1.1E+01	17,593	26
CR51	1.0E+08	2.2E+04	8.1E+02	123,305	27
CS134	6.0E+04	4.2E+01	1.4E+01	4,444	3
CS137	8.9E+04	6.0E+01	1.4E+01	6,593	4
EU152	1.3E+05	2.0E+02	2.4E+01	5,350	8
EU154	1.1E+05	2.0E+02	1.4E+01	8,148	15
EU155	7.3E+05	9.4E+02	5.4E+01	13,494	17
FE55	1.1E+07	5.4E+03	1.1E+03	10,185	5
FE59	1.8E+06	6.0E+02	2.2E+01	83,333	28
GD153	1.4E+06	1.0E+03	1.4E+02	10,370	7
GE68	5.8E+05	1.0E+03	8.1E+00	71,517	123
H3	3.0E+05	1.6E+04	1.1E+03	278	15
HF181	2.2E+06	7.6E+02	2.4E+01	90,535	31
HG203	4.3E+05	3.6E+02	2.4E+01	17,695	15
HO166M	4.0E+04	7.2E+01	8.1E+00	4,932	9
I125	2.4E+03	5.6E-01	5.4E+01	44	0
I131	1.8E+03	9.2E-01	1.4E+01	133	0
IN114M	3.7E+05	2.2E+02	8.1E+00	45,623	27
IR192	1.2E+06	9.4E+02	1.4E+01	88,889	70
K40	4.7E+03	1.7E+02	1.6E+01	290	10
KR85	2.8E+07	2.0E+04	2.7E+02	103,704	74
MN52	4.0E+06	3.4E+02	8.1E+00	493,218	42

MO99	7.8E+06	3.4E+03	1.4E+01	577,778	252	
NA22	6.3E+03	2.4E+02	1.4E+01	467	18	
NB94	8.6E+04	2.0E+02	1.6E+01	5,309	12	
NI63	4.5E+06	5.4E+03	8.1E+02	5,549	7	
NP237	5.8E+01	4.2E-01	5.4E-03	10,721	78	NP238 NOT IN 49 CFR
P32	4.4E+03	1.2E+01	8.1E+00	543	1	
P33	3.0E+04	9.4E+01	2.4E+01	1,235	4	
PB210	2.2E+03	3.6E-01	2.4E-01	9,053	1	
PM145	1.1E+06	2.0E+03	1.9E+02	5,820	11	
PM147	8.4E+05	1.0E+03	2.4E+01	34,568	41	
PO210	3.5E+02	1.9E+00	5.4E-01	647	4	
PU238	6.2E+01	6.2E-01	5.4E-03	11,460	115	
PU239	5.6E+01	5.2E-01	5.4E-03	10,351	96	
PU241	2.9E+03	3.2E+01	2.7E-01	10,741	119	
RA223	3.8E+03	6.2E+01	8.1E-01	4,686	76	
RA224	9.9E+03	2.0E+02	1.6E+00	6,111	123	
RA225	3.8E+03	7.2E+01	5.4E-01	7,024	133	
RN222	1.6E+08	1.0E+01	1.1E-01	1,481,481,481	93	
RU106	6.5E+03	1.0E+02	5.4E+00	1,201	18	
S35	2.5E+04	7.8E+01	5.4E+01	462	1	
SB124	1.3E+06	3.6E+02	1.4E+01	96,296	27	
SB126	2.5E+06	2.8E+02	1.1E+01	231,481	26	
SC46	1.4E+06	3.6E+02	1.4E+01	103,704	27	
SE75	3.4E+05	3.2E+02	8.1E+01	4,192	4	
SM151	9.9E+05	1.0E+03	1.1E+02	9,167	9	
SN113	3.2E+06	1.3E+03	1.1E+02	29,630	12	
SN123	9.5E+05	3.2E+02	1.4E+01	70,370	24	
SN126	3.3E+05	1.7E+02	8.1E+00	40,691	21	
SR89	7.7E+05	3.4E+02	1.4E+01	57,037	25	
SR90	2.2E+04	1.6E+01	2.7E+00	8,148	6	
TB160	1.3E+06	5.6E+02	1.4E+01	96,296	41	
TC99	3.8E+06	1.7E+03	2.4E+01	156,379	70	
TE127M	1.5E+05	4.0E+02	1.4E+01	11,111	30	
TE129M	1.4E+05	4.0E+02	1.4E+01	10,370	30	
TH228	9.2E+01	1.0E+00	1.1E-02	8,440	92	
TH230	8.9E+01	6.2E-01	5.4E-03	16,451	115	TH232 UNLIMITED A2
TI44	3.2E+04	6.2E+01	5.4E+00	5,915	11	
TM170	1.2E+06	5.2E+02	1.4E+01	88,889	39	
U233	2.2E+02	4.2E+00	2.7E-02	8,148	156	
U234	2.2E+02	4.2E+00	2.7E-02	8,148	156	
U235	2.4E+02	4.2E+00	2.7E-02	8,889	156	U>5%
V48	3.0E+06	6.4E+02	8.1E+00	369,914	79	U238 UNLIMITED A2
XE133	1.8E+06	2.0E+04	5.4E+02	3,327	37	
Y91	6.5E+05	3.6E+02	8.1E+00	80,148	44	
ZN65	1.6E+06	2.4E+02	5.4E+01	29,575	4	
ZR93	8.9E+04	6.2E+01	5.4E+00	16,451	11	
ZR95	1.5E+06	7.0E+02	2.4E+01	61,728	29	
			Average	16,347,023	48	(TC/A2 high due to one isotope (Rn222))

AVE T3/A2 = 50

AVE T2/A2 = 50 E4 (exclude high & low value)

Attachment 6

Onsite Working Group Survey Summary

QUESTION	HANFORD	INEEL	LANL	LLNL	ORNL	PNNL	SNL	SRS
Strategy to implement 1027-92?	Requesting HQ clarification of 1027 application	Using DOT A2 values to screen. Use 1027 to categorize for >A2	Using DOT based thresholds	1027 used to determine when 830 applies	1027 used to determine when 830 applies	Requesting HQ clarification of 1027 application	Using DOT based thresholds	Using DOT based thresholds
Is Safe Harbor being used to meet 830?	Yes, issuing new TSD*.	Yes	Yes, modifying TSD	Yes, developing new TSD, with TSRs and USQ process	Yes, modifying TSD	Yes, modifying TSD	Yes, modifying TSD	Yes, using current 460.1A based TSD
Strategy for meeting DSA requirement?	New TSD, and PSSD**	TSD and PSSD	Modified TSD and PSSD	New TSD and PSSD	Modified TSD and PSSD	Modified TSD and PSSD	Modified TSD	TSD and PSSD
Strategy for defining TSRs?	TSD invokes admin. TSRs	No transport TSRs	TSRs will be used for activities outside TSD	TSRs will be included in TSD	Existing admin. controls are equiv. to TSRs	TSRs will be included in TSD. TSR apply only to >1A2 Curies	TSR-like parameters in TSD	No transport TSRs
Strategy to implement USQ process?	TSD invokes transport configured USQs	Use BBWI USQ process	USQ-like process in place	USQ process defined in TSD	USQ process defined in TSD	TSD specifies USQ process similar to 5480.21	Use documented non-routine transfer process	TSD covers activities dealt with in USQs
Estimated One time cost to implement requirement?	TBD	2100 hours labor for DSA (~$200k)	$50k	$600k for development of program	Three months to generate draft TSD, cost TBD	$200k	$70-115k	$570k – 1.1M if USQ/TSR were implemented
Ongoing annual cost of 830 requirement?	TBD	$50-100k additional	$1M overall	TBD	TBD, but costs will increase w/o added safety	$75k (annually?)	$10-20k for USQ process. $2M annually for full 830 implement.	$250-700k if USQ/TSR were implemented
Value added in meeting 830 requirement?	USQ Process expected to add value. May reduce RL review time and help audits	No substantial value added identified	No safety benefit from upgrading TSD or developing TSRs	No identified value added	No identified value added. Current program speaks for itself	Improves clarity of PSSD, clarifies DOE approval of PSSD chg.	No identified value added. Familiar DOT/NRC methods work well	No identified value added.

* Transportation Safety Document (TSD) ** Package Specific Safety Documentation (PSSD)

Attachment 6
Onsite Working Group Survey Summary

QUESTION	HANFORD	INEEL	LANL	LLNL	ORNL	PNNL	SNL	SRS
Does DOE currently approve your PSSD? (Y/N)	Yes, PSSD initially approved by DOE when listed in TSD	Yes	Yes	TBD	No	Yes, PSSD included in TSD.	No, but PSSD process is DOE approved	No, but PSSD approval process is DOE approved
Other comments?	Prefer onsite T&P format under 460.1A, not 3009 format	Current 460.1A process has rigor & controls for safe onsite transport	Current 460.1A process good. 830 will cost but not enhance safety	Current onsite methods have outstanding safety record. Implementa-tion of 830 will be costly.		Negative impacts of 830 may offset positive points noted above	Rule being imposed over objection of P&T community	460.1A is sufficient. No value added from TSRs and USQ process, but increased complexity and cost